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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,385	02/27/2002	Satoshi Hirahara	220049US0	4760

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EXAMINER
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VO, HAI

ART UNIT	PAPER NUMBER
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1771

DATE MAILED: 01/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/083,385

Applicant(s)

HIRAHARA ET AL.

Examiner

Hai Vo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11,13-15,30,32,34,36-40 and 42-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11,13-15,30,32,34,36-40 and 42-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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1. The art rejections are maintained.
2. The 112 claim rejections are considered moot in view of claim cancellation. As pointed out by Applicants, support for the amendment to claims 1, 42, 43, 46 and 47 is found at page 27 and figure 2 of the present specification.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-11, 13-15, 30, 32, 34, 36, 37, 42, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) in view of Koshany et al (US 6,183,898) substantially as set forth in the 09/08/2004 Office Action. With regard to newly added claims 42-45, Miwa teaches the binder can be polyvinyl alcohol, polyester, polyacrylamide (column 7, lines 25-27). Miwa teaches the binder present in the amount from 5 to 30% by weight based on the total weight of the carbon fiber mat (column 7, lines 38-40) within the claimed range. Miwa teaches that the binder diluted with the solvent is attached to the carbon fibers by spraying. It appears that Miwa uses the same technique to attach the binders to the carbon fibers as Applicants. Therefore, it is not seen that the binder could not have been present discontinuously as particles on the surface of the fibers as the same technique how to apply the binder to the fiber mat is employed. In accordance with the process disclosed in the Miwa invention, the carbonaceous fiber mat comprises

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the carbonaceous fibers bonded to each other with the binder wherein the binder is present discontinuously as particles on the surface of the fibers and the carbonaceous fiber further are coated to a greater and more uniform degree with a carbonizable resin since Miwa applies the resin to the fibers by dipping the fibers into the solution of the resin. Since the claims are completely silent as to the composition of the binder or what is made of the binder, the fiber sheet of Miwa does disclose discontinuous point contact of a binder at only some part of the surfaces of the fiber sheet in addition to the coating of the carbonizable resin on the surface of the fibers.

5. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Schultz (US 3,960,601) substantially as set forth in the 09/08/2004 Office Action.
6. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Kato (US 6,127,059) substantially as set forth in the 09/08/2004 Office Action.
7. Claims 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miwa et al (US 4,851,304) in view of Koshany et al (US 6,183,898) as applied to claim 1 above, further in view of Tajiri et al (US 5,648,027). Miwa does not specifically disclose the particle size of the polyvinyl alcohol. Tajiri, however, teaches a porous carbonaceous material comprising a polyvinyl alcohol having a particle size

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from 0.1 to 500 microns within the claimed range (column 8, lines 60-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the polyvinyl alcohol having a particle size instantly claimed motivated by the desire to obtain the carbonaceous sheet with desired pore size, thus improving mechanical properties.

8. Claims 1-11, 13-15, 30, 32, 34, 36-38, and 42-47 are rejected under 35 U.S.C.

103(a) as being unpatentable over Tajiri et al (US 5,648,027) in view of Koshany et al (US 6,183,898). Tajiri teaches a porous carbonaceous material comprising a carbonaceous fibers bonded to one another with a phenolic resin in an amount of 28% by weight (table 2, example 9). The organic granular material of Tajiri also corresponds to Applicant's binder as well and present in amount of 7% by weight (table 2, example 9). The phenolic resin applied to the carbon fibers is in the form of dispersion in accordance with the process as described in the Tajiri invention, therefore, it is not seen that the phenolic binder could not have been present discontinuously as particles on the fiber surface as the same technique is used. Tajiri teaches the phenolic resin present in the particulate form with a particle size from 50 to 300 microns (column 8, lines 60-65). Tajiri teaches the carbonaceous fiber being randomly oriented and having a fiber diameter of 5 to 50 microns within the claimed range (column 6, lines 5-10). Tajiri teaches the porous substrate having a thickness, air permeability and resistivity within the claimed ranges (table 1, column 9, lines 45-47). Tajiri does not specifically teach a basic weight of the carbonaceous fiber. Therefore, it is necessary and thus obvious for the skilled

artisan to look to the prior art for the suitable basic weight of the carbonaceous fiber. Koschany teaches a porous gas diffusion electrode comprising carbonized fiber with a basic weight less than 150 g/m<sup>2</sup> within the claimed range (column 2, lines 43-55). Such is also taught by Koschany to provide the lightweight electrode having desired open porosity, which is important to the expectation of successfully practicing the invention of Miwa and thus suggesting the modification. In the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbonized fiber with a basic weight instantly claimed, motivated by the desire to provide the lightweight electrode having desired open porosity.

Tajiri does not specifically teach the carbonaceous fibers in the form of woven fabrics. Koschany teaches a porous gas diffusion electrode comprising carbonized fiber in the form of woven fabrics (column 2, line 40). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbonized fibers in the form of woven fabrics because such is an intended use of the material and Koschany provides necessary details to practice the invention of Tajiri.

Tajiri as modified by Koschany does not specifically teach the bending resistance and degree of fluffing of the carbonaceous fiber sheet. However, it appears that the porous carbonaceous material of Tajiri as modified by Koschany is made of the materials having the same composition as the conductive carbonaceous fiber sheet of Applicants. Further, in the Tajiri invention, the phenolic thermosetting

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particles are applied to the carbon fibers in the form of dispersion. This is exactly how Applicants do to attach the binder to the carbonaceous fibers. The resulting conductive carbonaceous fiber sheet has the thickness, basic weight, gas permeability and resistivity within the claimed ranges. Since the composition, thickness, basic weight and resistivity altogether dictate a bending resistance and degree of fluffing of the conductive carbonaceous fiber sheet, it is not seen that the bending resistance and degree of fluffing would have been outside the claimed range when the thickness, basic weight and resistivity are within the claimed ranges and the two articles are formed from the same composition.

9. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajiri et al (US 5,648,027) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Schultz (US 3,960,601). Tajiri is silent as to the axial orientation of the carbonized fibers. Schulz, however, the fuel cell electrode produced from highly oriented carbonaceous fibers to have higher thermal stability and electrical conductance (column 11, lines 65-68), which is important to the expectation of successfully practicing the invention of Tajiri, thus suggesting the modification. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the highly oriented carbonized fiber as taught in the Schulz reference for the randomly dispersed carbonized fiber, motivated by the desire to provide the electrode having higher thermal stability and electrical conductance.

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10. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajiri et al (US 5,648,027) and Koshany et al (US 6,183,898), as applied to claim 1 above, further in view of Kato (US 6,127,059). Tajiri is silent as to the carbonized fibers made from twisted yarns. Kato, however, teaches a gas diffusion layer for a solid polymer electrolyte fuel cell comprising carbonaceous fibers formed from twisted yarns (column 3, lines 40-45). Kato also discloses that carbon fiber woven cloth and carbonized fibers are equivalent fibers for use in fuel cell electrodes. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the carbon fiber woven cloth for the randomly dispersed carbonized fiber of the Tajiri invention since these two fibers have been shown in the art to recognized equivalent fibers for use in fuel cell electrodes.

#### ***Response to Arguments***

11. The art rejections over Miwa in view of several references are maintained for the following reasons. Applicants argue that Miwa does not teach or suggest a carbonaceous fiber mat wherein the binder is present discontinuously as particles on the surface of the fibers. The examiner disagrees. Applicants' attention is directed to column 7, lines 35-52 of the Miwa reference where the carbon fiber mat is made prior to impregnating with a carbonizable resin. Miwa teaches the binder can be polyvinyl alcohol, polyester, polyacrylamide (column 7, lines 25-27). Miwa teaches that the binder diluted with the solvent is attached to the carbon fibers by spraying. It appears that Miwa uses the same technique to attach the binders to the carbon fibers as Applicants. Therefore, it is not seen that the binder could not have been



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present discontinuously as particles on the surface of the fibers as the same technique how to apply the binder to the fiber mat is employed. In accordance with the process disclosed in the Miwa invention, the carbonaceous fiber mat comprises the carbonaceous fibers bonded to each other with the binder wherein the binder is present discontinuously as particles on the surface of the fibers and the carbonaceous fiber further are coated to a greater and more uniform degree with a carbonizable resin since Miwa applies the resin to the fibers by dipping the fibers into the solution of the resin. Since the claims are completely silent as to the composition of the binder or what is made of the binder, the fiber sheet of Miwa does disclose discontinuous point contact of a binder at only some part of the surfaces of the fiber sheet in addition to the coating of the carbonizable resin on the surface of the fibers.

### ***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on M,T,Th, F, 7:00-4:30 and on alternating Wednesdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HV

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